Name _____

Sex-linked Crosses

One of the important genes carried on the X chromosome is responsible for normal color vision. The dominant allele (N) produces normal color vision. The recessive allele (n) causes colorblindness.

- Write the genotypes of the parents
- Show the cross in a Punnett square
- List the genotypic and phenotypic ratios
- Determine the probabilities indicated

1. Cross a colorblind male with a homozygous normal female. ♂ X^nY X X^NX^N ♀

	X^N	X^N
X^n	X^NX^n	X^NX^n
Y	X^NY	X^NY

Genotypic ratio:
1 X^NX^n : 1 X^NY

Phenotypic ratio:
1 normal female : 1 normal male

Probability of having a child who is:
A normal female 1/2
A normal male 1/2
A colorblind female 0
A colorblind male 0

2. Cross a colorblind male with a heterozygous normal female. ♂ X^nY X X^NX^n ♀

	X^N	X^n
X^n	X^NX^n	X^nX^n
Y	X^NY	X^nY

Genotypic ratio:
1 X^NX^n : 1 X^nX^n : 1 X^NY : 1 X^nY

Phenotypic ratio:
1 normal female: 1 colorblind female:
1 normal male : 1 colorblind male

Probability of having a child who is:
Normal 1/2
Colorblind 1/2
Probability a male offspring would be:
Normal 1/2
Colorblind 1/2
Probability a female offspring would be:
Normal 1/2
Colorblind 1/2

Hemophilia is a serious sex-linked disorder in humans resulting in failure of the blood to clot properly. It is transmitted by a recessive allele (h) on the X chromosome. A mother who is X^HX^h is considered a carrier of hemophilia, but does not have hemophilia herself.

- Write the genotypes of the parents
- Show the cross in a Punnett square
- List the genotypic and phenotypic ratios
- Determine the probabilities indicated

3. Cross a normal male with a heterozygous normal female (carrier). ♂ X^HY x X^HX^h ♀

	X^H	X^h
X^H	X^HX^H	X^HX^h
Y	X^HY	X^hY

Genotypic ratio:
1 X^HX^H: 1 X^HX^h : 1 X^HY : 1 X^hY

Phenotypic ratio:
2 normal females : 1 normal male :
1 male with hemophilia

Probability of having a child who is:
A normal female 1/2
A normal male 1/4
A female with hemophilia 0
A male with hemophilia 1/4

4. Cross a male with hemophilia with a homozygous normal female. ♂ X^hY x X^HX^H ♀

	X^H	X^H
X^h	X^HX^h	X^HX^h
Y	X^HY	X^HY

Genotypic ratio:
1 X^HX^h : 1 X^HY

Phenotypic ratio:
1 normal female : 1 normal male

Probability of having a child who is:
Normal 100%
A hemophiliac 0
Probability a male offspring would be:
Normal 100%
A hemophiliac 0
Probability a female offspring would be:
Normal 100%
A hemophiliac 0